

# Christopher Shaffer, Ph.D.

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Data scientist with research experience focused on neuromorphic devices for machine learning. I transitioned from hardware into software after developing a passion for machine learning.

## SKILLS

**Software:** Python (TensorFlow, pandas, Keras, scikit-learn, NumPy), SQL, Git, MATLAB, C++, LabVIEW, R (basic)

**Machine Learning:** Neural networks, EDA, Random Forests, Gradient Boosting, NLP, Time Series

## EDUCATION

**Galvanize Data Science Prep & Immersive** 2/2021 – 8/2021  
Data science bootcamp emphasizing Python, statistics, and machine learning approaches.

**University of California, Los Angeles (UCLA), Los Angeles, CA** 9/2013 – 12/2020  
**M.S., Ph.D., Mechanical Engineering, Nanotechnology Emphasis** Advisor: Professor Yong Chen

- Dissertation: Self-Programming Neuromorphic Integrated Circuit for Intelligent Systems
- Coursework: Machine Learning, Stochastic Processes, Linear Dynamic Systems, Nanoscience, Analog Circuits

**University of California, Berkeley, Berkeley, CA**  
**B.S., Mechanical Engineering** 8/2007 – 5/2011

## WORK & RESEARCH EXPERIENCE

**Prof. Yong Chen Research Lab at the University of California, Los Angeles** 9/2013 – 12/2020  
**Graduate Student Researcher**

- Fabricated a novel 20x20 synaptic resistor crossbar circuit with exceptionally high energy efficiency.
- Created a LabVIEW interface to perform speech recognition by stochastic gradient descent and backpropagation to directly modify synaptic transistor conductances as synaptic weights.
- Implemented a neural network-based control system to optimize the shape of a morphing wing in real-time.

**KLA-Tencor, E-Beam Division** 7/2011 – 8/2013  
**Integration Engineer**

- Integrated electro-mechanical systems for an electron beam lithography tool. Tested experimental microchips.

**University of California, Berkeley** 1/2010 – 5/2011  
**Undergraduate Student Researcher**

## PROJECTS

- **Handwritten Digits:** Wrote a MATLAB program in for neural network-based optical recognition of handwritten digits with 87% recognition rate. Rigorously defined the model from scratch without depending on external ML modules.
- **Housing Price Prediction:** (Kaggle Competition): Applied feature engineering and an XGBoost Regressor to predict housing prices in Ames, Iowa. Achieved sufficiently low error to place in the top 4% of submissions.
- **Titanic Survival Prediction:** (Kaggle Competition): Correctly identified survivors of the Titanic shipwreck using an XGBoost Classifier. Attained ~0.8 classification accuracy, placing in the top 7% of submissions.

## PUBLICATIONS

Danesh\*, C. D., **Shaffer\*, C. M.**, *et al.* "Synaptic Resistors for Concurrent Inference and Learning with High Energy Efficiency." *Advanced Materials* **31**, 1808032, doi:10.1002/adma.201808032 (2019). (**\*equal contribution**)

**Shaffer, C. M.**, Deo, A., *et al.* "Self-programming synaptic resistor circuit for intelligent systems." *Advanced Intelligent Systems* (Accepted 2021)

Shenoy, R., Tudor, A., Nathan, D., **Shaffer, C. M.**, Danesh, C. D, Chen, Y. "Self-programming circuit with real-timing learning functions" (under review)